

Vegetation of South Western Qatar

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ABSTRACT. The environment and vegetation of an area in south-western Qatar have been studied. The area comprises different ecogeomorphological systems including: the littoral coastal plain, miocene ridges, rocky and conglomerate hamadas, colian sand formation, depressions, wadis and runnels.

The area lies within the subtropical dry zone of the desert. Rainfall is scanty and irregular both in time and space.

The vegetation comprises fifteen plant communities including:

a) Eight xerophytic plant communities dominated by *Acacia tortilis-Lycium shawii*, *Panicum turgidum*, *Zygophyllum quatarense*, *Pennisetum divisum*, *Hammada elegans*, *Rhanterium epapposum*, *Leptadenia pyrotechnica* and *Glossonema edule*.

b) Seven halophytic plant communities dominated by *Halopyrum mucronatum*, *Halopeplis perfoliata*, *Halocnemum strobilaceum*, *Limonium axillare*, *Anabasis setifera*, *Aeluropus lagopoides* and *Suaeda vermiculata*.

The communities and their habitats were described. The segetal flora has been investigated.

Ecological and phytosociological studies in Qatar are lacking and the vegetation of the country is not yet studied in detail. Batanouny (1981) gave a brief account of the main

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plant communities in the country. The present study aims at recording, more or less, detailed information of the environment and the vegetation of the south-western part of Qatar. It explores the pattern of plant communities, their ecological relationships and the factors which seem to affect their distribution. This investigation has evolved from several field trips during the period over February-May, 1979, after a reconnaissance survey in the area. The '*Ecology and Flora of Qatar*' (Batanouny 1981) was consulted for the identification of the species recorded in the present study.

The Area Surveyed

The area under study lies in the south-western corner of the peninsula of Qatar (Map 1). The area is bound to the west by the Gulf of Salwa. The choice of this area for the present study is due to the fact that it offers the chance to study side by side various habitats. It is noteworthy that the highest point in Qatar lies in this part of the country; reaching 103 m above mean sea level. The landscape in the study area is not as monotonous as other parts to the north of the country. Elevations at a level of 60 m or more above sea level as well as depressions and low-lying coastal plain and sebkhas near the sea level occur in the area.

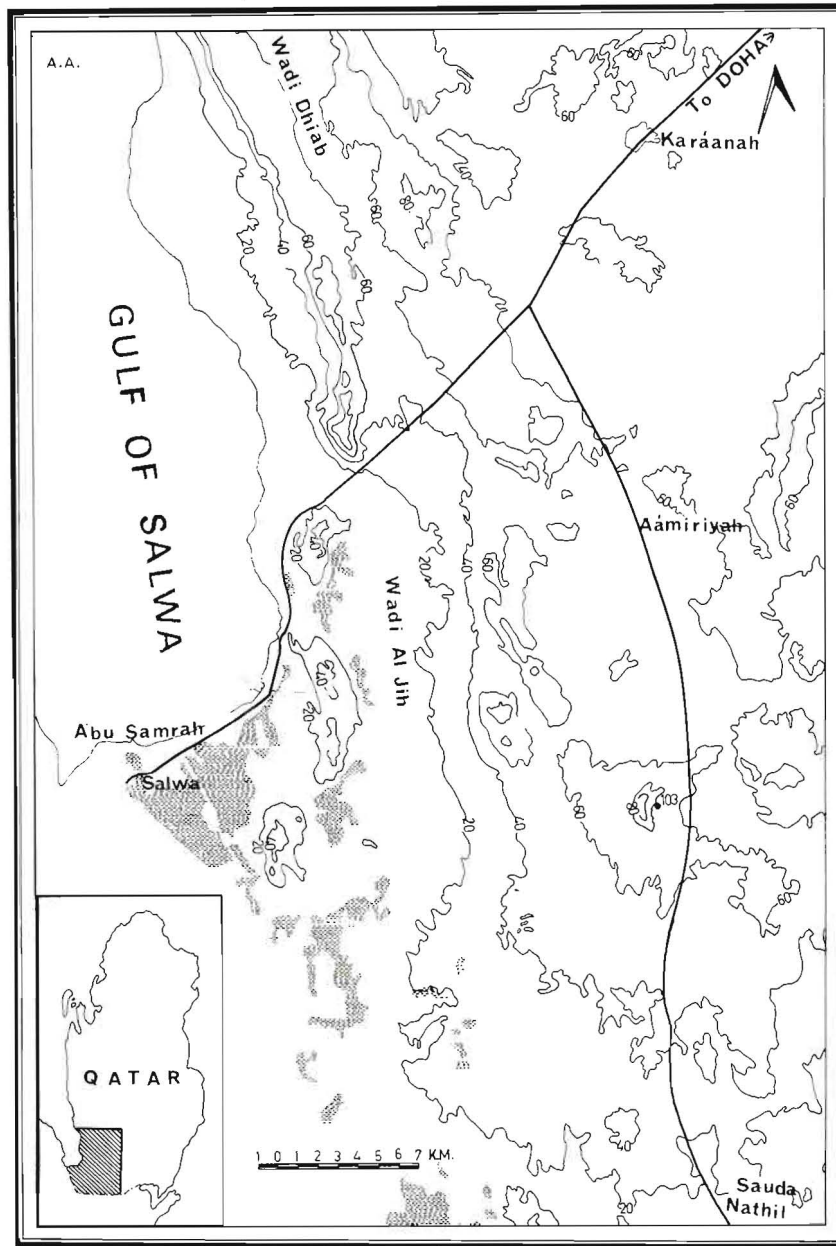
The relatively large settlement of Karáanah is situated in the study area along the road from Doha to the borders. Also, there are other minor settlements in addition to two frontier posts, namely Abu Samrah and Sauda-Nathil.

The area comprises different ecogeomorphological systems discernible on the bases of topographical features, characteristics of the surface deposits, water resources and the plant life. The main systems include: the littoral coastal plain, Miocene ridges, rocky and conglomerate hamadas, eolian sand formations, depressions (*Rodat*), wadis and runnels.

The littoral coastal plain extends along the shores of the Gulf of Salwa. From the shore line landwards one distinguishes different habitats, which vary according to their elevation above sea level, soil attributes and distance from the Gulf. Each of these habitats is occupied by a particular plant community.

The most important ridge in the area is that extending parallel to the coast till the Doha-Abu Samrah road, then turns slightly to the east and ends to the north of latitude 24° 30'N. Along its landward side there is Wadi Dhiab. The Wadi receives considerable amounts of runoff water and sediments. On the top of the ridge there are shallow short runnels which harbour thin plant growth.

The rocky and conglomerate hamadas are prominent features in the study area. These elevated parts are locally known as *hozoom* (singl. *hazm*). A *hazm* denotes the slightly elevated land covered by stones and gravel; it is exemplified by the piece of land separating two depressions. The rain water runs on the *hazm* surface and collects in depressions with its load of fine sediments.



Map 1 · A topographical map of south-western Qatar

· · · · Sabkha

· 103 Height in m.

Depressions, known locally as *Rodat* (singl. *Rodah*), usually indicating collapse structures, are sites with shallow coarse deposits. These depressions harbour denser vegetation compared to elevated sites as regards local topography.

The eolian sand formations occur in different forms and are remarkable features of the study area. Barchans locally known as *Téus* (singl. *Tüs*), occur along the road to Sauda-Nathil and Abu Dhabi. They attain heights of 20 to 40 m and are devoid of plant cover. Sand deposited by wind in depressions and in the leeward side of ridges support particular plant communities.

The sheep farm at Abu Samrah occupies a vast area where fodder plants are cultivated. Irrigation is achieved by motor driven pumps extracting the groundwater. The introduction of irrigated agriculture in the area has remarkable ecological consequences. Among these may be mentioned the salinization of the land and the change in the plant life.

Climat

During the course of the integrated water and land use project in Qatar (UNDP/FAO) some hydrometeorological stations have been established at various localities in the country. Three of these stations are located in the study area, namely Karáanah, Aámiriyah and Abu Samrah. Data obtained from these stations are used in the present study.

Rainfall

Examination of the rainfall data given in Table 1 reveals three main characteristics of the rainfall, namely scantiness, irregularity and seasonality. The average rainfall is 76.1 mm at Karáanah, 58.5 mm Aámiriyah and 54.6 mm at Abu Samrah. The rainfall at the three stations is confined to the period extending from October to April. The dry rainless period extends over 5 months from May to September. However, in exceptional years rain may fall in May or September, but with low efficiency.

Rainfall is variable and irregular, both in time and space. It varies widely from year to year at the three stations, *e.g.* at Karáanah the annual rainfall ranges from 41.0 mm in 1973 to 138.8 mm in 1976. Such a wide variation is observed at the other stations. The quotient of variation, which is the ratio of maximum annual to the minimum annual rainfall reaches 3.4 at Karáanah, 7.3 at Aámiriyah and 4.8 at Abu Samrah. Irregularity is not only from year to year, but also there is a considerable variation between the corresponding months in the different years. For example, at Karáanah the rainfall in January was 41.0 mm in 1973, 59.0 mm in 1975, 1.2 mm in 1976, 44.4 mm in 1977, and no rainfall in the years 1972, 1974, 1978 and 1979. This phenomenon could be noted in all months at the three stations. It is remarkable that no rain has been recorded in September at the three stations over the period of observation except in 1978 at Karáanah. Batanouny (1981) states that no rain was recorded at other stations in the country in this month.

Table 1. Monthly and annual rainfall (mm) at three stations in the study area, south western Qatar.**Karáanah**

Year	J	F	M	A	M	J	J	A	S	O	N	D	Total
1972	—	8.0	31.6	8.8	—	—	—	—	—	—	—	—	48.4
1973	41.0	—	—	—	—	—	—	—	—	—	—	—	41.0
1974	—	34.9	18.0	—	—	—	—	—	—	—	—	—	52.9
1975	59.0	18.0	Tr	3.2	0.9	—	—	—	—	—	—	0.8	81.1
1976	1.2	61.2	33.5	14.9	—	—	—	—	—	Tr	28.0	—	138.8
1977	44.4	19.4	—	—	—	—	—	—	—	10.6	44.0	3.8	122.2
1978	—	12.2	—	2.4	—	—	—	—	40.0	6.0	—	—	60.6
1979	—	—	44.8	—	—	—	—	—	—	—	10.2	9.4	64.4
Average	18.2	19.2	16.0	3.7	0.1	—	—	—	5.0	2.0	10.2	1.7	76.1

Aámiriyah

Year	J	F	M	A	M	J	J	A	S	O	N	D	Total
1972	—	—	31.6	7.4	—	—	—	—	—	1.0	0.8	5.8	46.6
1973	13.0	—	—	—	—	—	—	—	—	+	+	+	+
1974	+	+	+	+	—	—	—	—	—	—	—	3.2	+
1975	45.0	12.2	6.2	2.4	1.4	—	—	—	—	—	—	1.4	68.6
1976	Tr	63.8	29.2	22.8	—	—	—	—	—	—	7.8	0.8	124.4
1977	30.2	13.6	3.6	1.0	—	—	—	—	—	—	—	0.8	49.2
1978	—	9.6	—	7.4	—	—	—	—	—	—	—	—	17.0
1979	5.2	—	22.0	—	—	—	—	—	—	—	—	18.0	45.6
Average	13.4	16.5	15.4	6.8	0.2	—	—	—	—	0.2	1.5	4.5	58.5

Abu Samrah

Year	J	F	M	A	M	J	J	A	S	O	N	D	Total
1976	—	62.2	35.1	17.2	—	—	—	—	—	—	0.6	—	115.1
1977	23.0	—	—	3.2	—	—	—	—	—	1.0	4.8	0.6	32.6
1978	—	7.8	0.6	15.4	—	—	—	—	—	—	—	—	23.8
1979	0.8	—	31.6	—	—	—	—	—	—	—	—	14.6	47.0
Average	6.0	17.5	16.8	9.0	—	—	—	—	—	0.2	1.3	3.8	54.6

+ not recorded Tr means rainfall less than 0.1mm

The spatial variation of rainfall is evident from the data presented in Table 1. In 1977, the rainfall amounted to 122.2 mm at Karáanah, 49.2 mm at Aámiriyah and 32.6 mm at Abu Samrah.

One of the remarkable features of rainfall in the study area, as in other parts of the country as well as arid zones, is the sudden cloudbursts which bring torrential rainfall. Heavy localized downpours on one day may be more than the average annual rainfall. On March 13, 1979 the rainfall recorded at Karáanah reached 42.8 mm. It is striking to know that 11 mm fell in 20 minutes on that day (Batanouny 1981).

As a consequence of the scarcity of rainfall, the soil moisture supply to the plants is very austere and variable. The surface deposits are almost air dry all the year round except for a few days in winter and spring during which there is a chance for the germination of seeds. Subsurface layers of deep soil may comprise a permanently wet layer. This represents the source of moisture to deeply penetrating roots of perennials.

Air Temperature

Data of air temperature are available from the station at Abu Samrah. Only three months have mean monthly air temperature below 20°C, namely January (16.4°C), February (17.4°C) and December (18.9°C). By the onset of March, the mean monthly air temperature rises above 20°C and continues to rise reaching 32.8°C in July and 32.6°C in August. A slight decrease is observed in September (31.1°C), which is followed by a progressive decrease in the following months. This evinces that the mean air temperature in the coolest month (January) is as half as that in the hottest month (July).

The mean monthly maxima range from 21.1°C in January to 38.3°C in August, while the mean minima range from 11.7°C in January to 27.5°C in July. Values of absolute temperatures range from 4.4°C in January to 47.2°C in June. These values indicate how far the plants growing in the study area are subjected to severe and wide fluctuations of air temperature.

Air Humidity

The relative humidity at Abu Samra is high throughout the year with an annual mean of 66.1%. The mean monthly values range from 59.5% in April to 72% in January. The lowest mean minimum is attained in April reaching 26.9%. Absolute maxima of 100% are not uncommon.

Climatic Aridity

The climatic diagram (after Walter, 1955) for Abu Samrah (Fig. 1) shows that the precipitation curve underlies the temperature curve throughout the year. This indicates climatic aridity. The area lies within the subtropical dry zone of the desert, and no humid period prevails during the whole year.

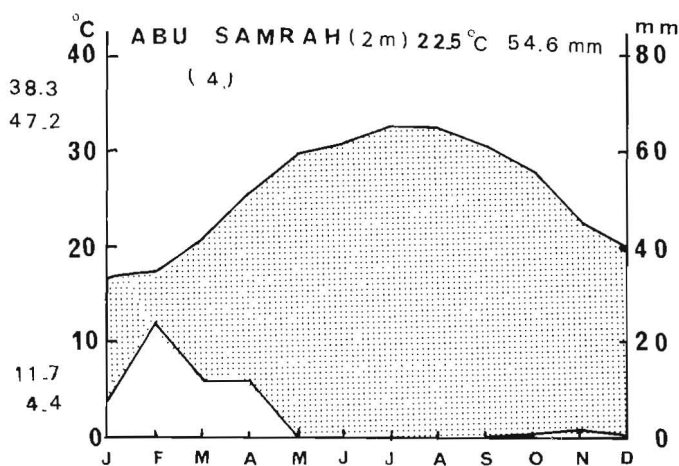


Fig. 1. Climatic diagram for Abu Samrah, Qatar.

Vegetation

Apart from the littoral coastal plain, the vegetation of the study area is of the restricted type according to the concept adopted by Walter (1963), *i.e.* the plant growth is confined to depressions receiving runoff water. In other words, the area is a runoff desert (Zohary 1962). The permanent framework of perennials has a low cover. In the wet season of the rainy years there is ample room for the growth of ephemerals, which disappear by the advent of the dry season. Seasonal variation of the plant cover are obvious in years with relatively high rainfall. In years with low rainfall ephemerals fail to appear and the cover of perennials is considerably reduced. Large parts of the plant body of perennials become dry; a mechanism by which the plants reduce their transpiring surface. This may be considered as a partial death for the sake of survival.

The vegetation in the study area comprises units that are recognizable on the bases of composition, structure and ecological relationships. These units are referred to as communities; each is named after the species that dominates the plant growth and gives its physiognomy.

In the present study, sixty five stands were studied. Each species was given the mixed abundance dominance scale according to Braun-Blanquet (1964). However, the concept of dominance and not of fidelity was adopted. The presence values of the different species were determined for every species in the various communities. The salient features of the habitats supporting the different plant communities were given. Soil samples were collected from some stands and analysed for their properties.

Communities and Habitat Features

I. Xerophytic Plant Communities

1. *Acacia tortilis*-*Lycium shawii* community

The dominant species are widespread in Qatar and exhibit wide ecological and sociological ranges. The plant cover ranges from 10 to 15% and the species population including ephemerals amount to 37. Stratification is clear in this community. The tree and shrub layer is represented by the two dominants. Associates with presence values more than 50% are *Panicum turgidum*, *Eleusine compressa*, *Zygophyllum quatarense*, *Convolvulus deserti* and *Rhanterium epapposum*. Those with presence values of 40% include *Corchorus depressus*, *Glossonema edule*, *Cassia italica*, *Indigofera articulata*, *Arnebia hispidissima*, *Lotononis platycarpa*, *Fagonia ovalifolia* and *Zygophyllum simplex*. Weakly represented species include *Helianthemum lippii*, *Eremopogon foveolatus*, *Monsonia heliotropoides* and *Launaea capitata*.

This community abounds in depressions which have shallow coarse-textured soil. Stones and gravels cover a considerable part of the ground surface. Wind is the main agent of transport. However, water running on the slopes of the elevated *hozoom* results in the deposition of fine sediments in the lower sites in the depressions. The soil is non-saline with low chloride content; being about 0.01% at the various depths. The total carbonate content ranges from 17.9 to 23.3%. The soil is poor in organic carbon content which ranges from 0.03 to 0.05% at the different depths. The soil is slightly alkaline with pH values of 7.4 to 7.8.

2. *Panicum turgidum* community

The dominant plant is a palatable grass known locally as *Thumam*; a common name in all the Arab countries. It is usually overgrazed by camels. The plant is an effective soil binder and forms phytogenic mounds of considerable size.

The plant cover ranges from 10 to 25%. In the wet season, the plant cover increases to 40% in some stands due to the appearance of ephemerals. Associates are numerous reaching 45 species. Those with high presence values, but with moderate performance include *Zygophyllum quatarense* (P=83%), *Rhanterium epapposum* (P=66%), *Cornulaca monacantha*, *Lycium shawii*, *Convolvulus deserti*, *Neurada procumbens* and *Polycarpaea repens* (P=50%). Associates with presence values of 30% include *Acacia tortilis*, *Indigofera articulata*, *Acacia ehrenbergiana*, *Eremopogon foveolatus*, *Hammada elegans*, *Heliotropium bacciferum*, *Stipagrostis plumosa*, *Lasiurus hirsutus*, *Zygophyllum simplex* and *Aerva javanica*. In some stands there are other associates with low presence values but they have considerable abundance in particular sites. These include *Launaea capitata*, *Arnebia hispidissima*, *Pennisetum divisum*, *Psoralea plicata*, *Eleusine compressa* and *Fagonia ovalifolia*.

This community occurs in depressions where sand is deposited by wind. The mounds formed by the dominant plant are 50 cm high. The surface soil on the mound

body is coarse-textured, while at deep layers the soil becomes fine-textured.

3. *Zygophyllum quatarense* community

The dominant species is one of the most common components of the flora of Qatar and contributes, to a great measure, to the vegetation of the country. The plant has succulent petioles and leaflets; a character which helps the plant to resist drought. However, these organs are shed under severe dry conditions to reduce the transpiring surface. The plant is unpalatable. This may be among the reasons of its widespread occurrence in Qatar.

The plant cover of this community is thin ranging from 5 to 15%. The species composition comprises 33 species. All the associates are weakly represented with presence values less than 40%. Associates with relatively high abundance in some stands include: *Cornulaca monacantha*, *Robbairia delileana*, *Stipagrostis plumosa*, *Fagonia ovalifolia*, *Eleusine compressa* and *Zygophyllum simplex*. Among the associates with low performance may be mentioned *Convolvulus deserti*, *Glossonema edule*, *Helianthemum kahiricum*, and *Launaea capitata*.

This community occurs in shallow depressions and runnels. Soil supporting this community is shallow and coarse-textured. The ground surface is usually covered with stones and rock fragments. Fine sediments accumulate around the body of the dominant plant.

4. *Pennisetum divisum* community

The dominant plant is a soil binder grass forming hillocks of considerable size. The community dominated by this species abounds in Wadi Dhiab and long runnels where the soil is mainly deposited by water. Soils are usually fine-textured.

The plant cover ranges from 10 to 40%; the dominant plant contributes to the main part of it. The tree and shrub layer is represented by *Acacia ehrenbergiana* (P=50%), *Acacia tortilis* (P=5%), *Ziziphus nummularia* (P=12%), *Lycium shawii* (P=35%) and *Leptadenia pyrotechnica* (P=35%). The suffrutescent layer comprises *Cornulaca monacantha* (P=100%), *Zygophyllum quatarense* (P=100%), *Rhanterium epapposum* (P=75%), *Indigofera articulata* (P=25%) and *Heliotropium bacciferum* (P=25%).

The grasses associated with the dominant plant are *Panicum turgidum* (P=25%), *Stipagrostis plumosa* (P=25%), *Eleusine compressa* (P=15%) and *Lasiurus hirsutus* (P=15%).

Among the ephemerals recorded in this community may be mentioned *Erodium laciniatum*, *Launaea capitata*, *L. cassiniana*, *Schismus barbatus*, *Arnebia hispidissima*, *Centaurea sinaica* and *Atractylis carduus*.

5. *Hammada elegans* community

The dominant plant is a desert chenopod with succulent cortex. Its community is restricted to south-west Qatar, where sand accumulates along the road from Karáanah to Abu Samra.

The plant cover is low; ranging from 5 to 10%. The associates have low performance and are weakly represented. These include *Zygophyllum quatarense*, *Panicum turgidum*, *Suaeda vermiculata*, *Seidlitzia rosmarinus*, *Salsola vermiculata*, *Lasiurus hirsutus*, *Polycarpha repens*, *Cornulaca monacantha*, *Cyperus conglomeratus* and *Cistanche phelypaea*.

The dominant plant forms hillocks. The uppermost layers of the mound body are less saline than deep layers. The chloride content is 0.01% at a depth of 0 to 12 cm, then it increases to 0.02% at a depth of 12-35 cm and 0.04% at a depth of 35-85 cm. The total carbonate content ranges from 14.3 to 18% at the various depths. The organic carbon content is negligible and the pH ranges from 7 to 7.3.

6. *Rhanterium epapposum* community

The dominant plant is an important palatable plant found mainly in southern Qatar. It is known locally as *Arfaj*, a name used in other Arab countries. Its community abounds in runnels where water-borne material is deposited among the rock fragments.

The plant cover ranges from 5 to 20%. Common associates include *Pennisetum divisum*, *Panicum turgidum* and *Zygophyllum quatarense*. Rare and weakly represented species include *Acacia ehrenbergiana*, *Eremopogon foveolatus*, *Chrysopogon aucheri*, *Aerva javanica* and *Cassia italica*.

7. *Leptadenia pyrotechnica* community

The dominant plant is a leafless shrub which is browsed by camels and cut for fuel. Its Arabic name is *Al-Markh*. The community occurs on deep sandy soil, where the effect of wind is prominent. It abounds in wide runnels along the road to the United Arab Emirates.

The plant cover is 20% on the average. Associated species include *Panicum turgidum*, *Cornulaca monacantha*, *Pennisetum divisum*, *Indigofera articulata* and *Stipagrostis plumosa*.

8. *Glossonema edule* community

The dominant plant, known locally as *Itr*, produces fruits which are eaten by the natives when young. The fruits are called by the natives as *Jarawah*. Though the plant is widespread in Qatar, the community dominated by it is of limited distribution. It occurs in shallow runnels draining the elevated *hozoom* towards the depressions. The

beds of these runnels are eroded by water. The soil is very thin and confined to the pockets among the rock fragments.

The plant cover is low ranging from 5 to 10%. The common associates include *Zygophyllum simplex*, *Herniaria hemistemon*, *Fagonia bruguieri*, *Stipagrostis obtusa* and *Fagonia glutinosa*.

II. *Halophytic Plant Communities*

1. *Halopyrum mucronatum* community

The dominant plant is a sand binder grass which forms sizeable hillocks; 50-60 cm high. Its growth is confined to a restricted area along the coastal beach in south-western Qatar. The plant cover reaches 60%. Associated species have low performance and grow between the mounds formed by the dominant plant. They include *Sporobolus arabicus*, *Suaeda vermiculata*, *Launaea nudicaulis* and *Cressa cretica*. Soil supporting this community is whitish, calcareous and coarse-textured.

2. *Halopeplis perfoliata* community

The dominant plant is a succulent halophytic chenopod. Its community occurs on sand beaches along the Gulf shore. The plant cover is 15 to 30%. Associates include *Salsola vermiculata*, *Halocnemum strobilaceum*, *Anabasis setifera* and *Zygophyllum quatarense*.

The habitat of this community is not inundated with sea water, and the dominant plant forms high mounds. The mound body is formed of moderately-textured sand. The total soluble salts are high in the soil; being 6.8% in the upper 20 cm and increases to 11.5% at a depth of 20 to 40 cm. At lower depths, the salt content decreases to 5.4% at a depth of 40 to 60 cm and to 7.6% at a depth of 60 to 80 cm. The chloride contents at these successive depths are 0.2, 0.25, 0.14 and 0.23%, respectively. The total carbonate content ranges from 39 to 46% at the different depths. The organic carbon content ranges from 0.07 to 0.09% and the soil is slightly alkaline.

3. *Halocnemum strobilaceum* community

This community occupies a limited area in a depression in the site inhabited by the *Halopeplis* community. The water table is nearer to the soil surface than in the case of *Halopeplis* community and the soil surface is covered with a salt layer mixed with fine soil.

The plant cover is high; being 60%. No associates are recorded in this community, except a few individuals of *Halopeplis perfoliata* along the margin of the depression occupied by the *Halocnemum* community.

4. *Limonium axillare* community

The dominant plant is a salt-secreting halophyte. It forms low mounds. The

ground surface between the mounds is severely eroded by wind and is covered by snails.

The plant cover is thin (10-15%). Consistent associates include *Suaeda vermiculata* and *Cistanche phelypaea* (parasitizing on the dominant species). Weakly represented associates are *Zygophyllum quatarense*, *Sporobolus arabicus* and *Anabasis setifera*.

The salt content of the uppermost layer is high (15.4%), but it decreases rapidly by depth. The chloride content is 0.37% at a depth of 2-20 cm and decreases to 0.05% at a depth of 20-50 cm and 0.07% at a depth of 50-75 cm. The total carbonate content ranges from 41 to 48%. The soil is alkaline (pH 7.2-7.8) and has an organic carbon content of 0.07 to 0.09%.

5. *Anabasis setifera* community

The community dominated by this succulent chenopod occupies a belt separated from the sea by the zones occupied by the *Halopeplis* and *Limonium* communities.

The plant cover is very thin (5% or even less). Associates are weakly represented and include *Zygophyllum quatarense*, *Suaeda vermiculata*, *Hammada elegans*, *Herniaria hemistemon*, *Limonium axillare* and *Cyperus conglomeratus*.

The soil is severely eroded by wind and the ground surface is covered with pebbles and coarse sand. The dominant plant accumulates fine sediments around its body.

6. *Aeluropus lagopoides* community

The dominant plant is a grass with widespread distribution in the coastal marshes of Qatar. Its community occurs on saline flats with fine-textured soil.

The plant cover ranges from 20 to 40%. Associated species have low performance and include *Sporobolus arabicus*, *Zygophyllum quatarense* and *Salsola baryosma*. The community may be in the form of a pure population of the dominant species.

7. *Suaeda vermiculata* community

The dominant plant is a chenopod with succulent leaves. It is known locally as *Suwweid* and is grazed by camels. The plant is a cumulative halophyte in which salts are accumulated in the leaves. The latter are shed when loaded with high salt content. This is a mechanism by which the plant gets rid of excessive salts.

The community dominated by this plant has a limited distribution in Qatar; being restricted to the south-western corner of the country. The plant cover is about 40%. The main associate is *Aeluropus lagopoides*. Other associates are weakly represented and include *Seidlitzia rosmarinus*, *Salsola baryosma*, *Sporobolus arabicus* and *Salsola cyclophylla*.

Mounds formed by the dominant plant are formed of fine-textured soil with high

salt content. The chloride content is 0.32% at a depth of 0-15 cm, 0.25% at a depth of 15-50 cm, 0.14% at a depth of 50-70 cm and 0.04% at a depth of 70-90 cm. The total carbonate content is high amounting to 60% on the average at various depths. The organic carbon content is also high, being 0.13% in the upper 15 cm and decreases by depth till it reaches 0.08% at a depth of 70-90 cm. The highest pH values are recorded in this community reaching 8.

The Segetal Flora

Alfalfa (*Medicago sativa*) and other introduced fodder plants (*Atriplex nummularia*) are cultivated in the sheep farm at Abu Samrah. The introduction of the irrigated agriculture depending on groundwater induced remarkable ecological changes in the environment, including salinization of the soil and the introduction of many species. The continuous spilling of water resulted in the appearance of many halo- and hydro-segetals in the farm. These include: *Phragmites australis*, *Cyperus laevigatus*, *Juncus rigidus*, *Cressa cretica*, *Sporobolus spicatus* and *Tamrix* spp. Other common weeds include *Cynodon dactylon* and *Amaranthus graecizans*.

Conclusion

The study area has an arid climate. The rainfall is scanty (54.6 to 76.1 mm/year) and exhibits a remarkable temporal and spatial irregularity. The physiography and the soil properties are the major factors affecting the distribution of the plant communities. Their main role is due to their influence on the water revenue of the different habitats and the soil moisture supply to the plants. The desert vegetation is of the restricted type (Walter 1963) or mode contracté (Monod 1954). In such a runoff desert (Zohary 1962), the permanent framework of perennial plants is confined to low parts, which receive runoff water in addition to water-borne and wind-blown sediments. The latter process affects the soil depth and other physical attributes of the soil, which in turn affect the plant-soil-water relationships. Depressions (*Rodat*) receive relatively high water revenue and support a plant growth dominated by trees and shrubs (*Acacia tortilis* and *Lycium shawii*). Wadis and wide runnels, where alluvial soil is deposited, support a plant growth dominated by *Pennisetum divisum* with shrubs and trees as associates. In shallow depressions with thin soil and rock fragments, the plant growth is dominated by *Zygophyllum quatarense*. When coarse sand is deposited by wind, the plant growth is dominated by *Panicum turgidum*. Further deposition of sand resulting in deeper soil allows for the appearance of the community dominated by *Leptadenia pyrotechnica*. On fine sandy soil, there is ample room for the *Hammada elegans* community. In narrow runnels crossing the *hozoom*, the soil is restricted to small pockets among the rock fragments. In such a habitat abounds the *Glossonema edule* community. However, in wider runnels with deeper soil, *Rhanterium epapposum* dominates the plant growth.

The halophytic vegetation is confined to the salt-affected land in the littoral coastal

plain. The distribution of the halophytic plant communities depends on different intermingled factors. These factors are: elevation above sea level, soil salinity, distance from the sea, inundation by sea water, soil texture and soil depth. It has been clear that the halophytic vegetation is more simple and homogeneous than the xerophytic vegetation. The number of associates is very low in halophytic communities. The occurrence of the *Halopyrum mucronatum* and *Suaeda vermiculata* communities in a limited area in south-western Qatar is of particular interest. The senior author has observed the occurrence of the *Halopyrum* community along the Red Sea coast near Jizan in Saudi Arabia. Such a particular geographical distribution needs further investigation. *Suaeda vermiculata* is a grazing plant for camels. The study of its range potentialities and geographical distribution in the Arabian Peninsula is indispensable.

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الكساء النباتي في جنوب غربي دولة قطر

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الدوحة - قطر

يتعلق البحث بدراسة البيئة والغطاء النباتي في منطقة تقع جنوب غربي دولة قطر. وتتضمن المنطقة التي درست عديداً من النظم الجيومورفولوجية البيئية مثل: السهل الساحلي، هضاب الميوسين، هضاب الحمّاد الصخرية، التكوينات الرملية، المنخفضات، الأودية والمسارب المائية.

وتقع المنطقة في منطقة الصحراء تحت المدارية الجافة، حيث المطر قليل وغير منتظم من حيث الزمان والمكان.

وأوضحت الدراسة وجود خمس عشرة عشيرة نباتية

على النحو التالي:

- (أ) ثمان عشائر نباتية صحراوية جفافية تسودها نباتات السمر، العوسج - الثمام - الهرم القطري - الثيموم - الرمث - العرفج - المرخ - العتر.
- (ب) سبع عشائر نباتية ملحية تسودها نباتات الهالوبيرم - الخريزة - الهالوكنيموم - القطف - الشعيران - العكرش - السويد.

كما أجريت دراسة على الأعشاب النامية في البيئة المنزرعة.

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